[0007a] In one aspect, there is provided a process for manufacturing an extruded powdered nutritional product, the process comprising:

providing a dry mixture comprising protein and carbohydrate and a liquid comprising water and fat;

contacting the dry mixture and liquid to produce a slurry;

feeding the slurry into an ultrasonically-assisted extruder to emulsify the fat with hydrated protein;

extruding the slurry to produce pellets; and

drying and grinding the pellets to produce a powdered nutritional product, wherein the powdered nutritional product comprises a free fat level of less than 5% by weight of the powdered nutritional product.

[0007b] In one aspect, there is provided a process for manufacturing an extruded powdered infant formula having a free fat level of less than 5% by weight of the powdered infant formula, the process comprising:

introducing protein and water into a preconditioner;

introducing fat into the preconditioner;

introducing from 0 to about 80 wt.% of a carbohydrate into the preconditioner;

contacting the protein, water, fat, and carbohydrate to produce a slurry;

feeding the slurry into a first ultrasonically-assisted extruder to emulsify the fat with hydrated protein;

introducing the remaining carbohydrate, vitamins, and minerals into a second preconditioner feeding the discharge of the first ultrasonically-assisted extruder to produce a second slurry;

ultrasonically extruding the second slurry to produce pellets; and

drying and grinding the pellets to produce a powdered infant formula, wherein the powdered infant formula comprises from about 10% to about 35% fat, from about 5% to about 35% protein, from about 30% to about 85% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered infant formula.